

PROPOSED

COVERED SOURCE PERMIT NO. 0452-01-C Review of Minor Modification Application No. 0452-03

Applicant/Facility: Kauai Power Partners

Equipment Location: UTM 460,895.6 m E; 2,432,847.1 m N Old Hawaiian Datum,
International Spheroid
TMK 3-8-03 Par 1; Field 390, Lihue, Kauai

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Proposed Project:

On April 18, 2002 Kauai Power Partners submitted a Fuel Sulfur/SO_x Emissions Monitoring Procedure as required by Special Condition No. E.5. of Covered Source Permit No. 0452-01-C (issued March 7, 2001) which states:

- E.5. At least thirty (30) days prior to initial start-up of the combustion turbine generator,** the permittee shall submit to the Department of Health in writing:
- a. A monitoring procedure for determining the sulfur content of all fuels fired in the combustion turbine generator. The procedure shall address how fuel sulfur content will be calculated taking into account the variability of each batch of fuel received at the site and shall be used to provide sulfur dioxide emissions to the Department of Health as required in this Attachment, Condition No. E.9. The procedure must receive written approval from the Department of Health prior to initial start-up of the combustion turbine generator.

An SO₂ continuous emissions monitoring system was proposed by Kauai Power Partners as the means to monitor compliance with the combustion turbine SO₂ emission limit of 200 tons on a rolling 12-month basis. On April 30, 2002 the Department of Health approved the use of an SO₂ continuous emissions monitoring system (CEMS) to monitor compliance with the emission limit. The Department's letter includes a number of

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stipulations on the use of the CEMS (see attached DOH letter dated April 30, 2002 for details). Details of the SO₂ CEMS follows:

1. The monitor will be a Thermo Environmental Model 43C.
2. SO₂ concentrations will be measured on a continuous basis and recorded on a 15-minute average basis. SO₂ concentrations will be used to calculate mass emission rates using an F-factor calculation. Valid 15-minute average values will be used to calculate one-hour average values. Valid 1-hour average mass emission rates will be summed to calculate daily emission rates, and daily rates will be summed to calculate monthly total emission rates. At the end of each month, a rolling 12-month total will be calculated and compared with the 200 ton/year limit to determine compliance.
3. The SO₂ CEMS is required to comply with the requirements of 40 CFR 60.13 and 40 CFR 60 Appendices B and F.

In addition to the CEMS proposal, Kauai Power Partner's April 18, 2002 letter proposes a number of changes to fuel sulfur/SO₂ monitoring requirements in the permit. These changes fall under the category of minor modification as defined in the Hawaii Administrative Rules §11-60.1-81. On May 23, 2002, Kauai Power Partners submitted an application for a minor modification to address the proposed changes.

This modification will amend the Covered Source Permit as follows:

1. Add permit conditions to address the use of the SO₂ CEMS;
2. Make changes to fuel sulfur/SO₂ monitoring, recordkeeping, and reporting conditions due to the addition of the SO₂ CEMS;
3. Revise several conditions to maintain consistency in the permit as a result of monitoring procedure changes;
4. Provide clarification on quarterly accuracy audits;
5. Add a monitoring report form for the internal floating roof petroleum storage tanks; and
6. Incorporate the conditions of the minor modification issued on February 6, 2002.

Equipment:

This modification addresses changes to the fuel sulfur/SO₂ monitoring requirements for the combustion turbine generator due to the addition of the SO₂ CEMS.

No changes to the combustion turbine generator or black start diesel engine generator are proposed. Details of the equipment can be found in the original permit review dated September 25, 2000 and the review for a minor modification dated February 6, 2002.

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Air Pollution Controls:

No changes are proposed. Details on air pollution controls are found in the original review dated September 25, 2000. No changes to the air pollution controls were made in the prior minor modification, see review dated February 6, 2002.

Applicable Requirements:

The proposed minor modification does not alter the determination made in the original review or minor modification review. See **Applicable Requirements** in the original review dated September 25, 2000 and in the minor modification review dated February 6, 2002.

Project Emissions:

The proposed modification does not affect emissions from the facility. See **Project Emissions** in the original review dated September 25, 2000 and in the minor modification dated February 6, 2002.

Air Quality Assessment:

The proposed modification does not change the air quality assessments performed in the original review dated September 25, 2000 and minor modification review dated February 6, 2002.

Amended Permit Conditions:

As stated in the **Proposed Project** section, this modification will amend the Covered Source Permit as follows:

1. Add permit conditions to address the use of the SO₂ CEMS;
2. Make changes to fuel sulfur/SO₂ monitoring, recordkeeping, and reporting conditions due to the addition of the SO₂ CEMS;
3. Revise several conditions to maintain consistency in the permit as a result of monitoring procedure changes;
4. Provide clarification on quarterly accuracy audits;
5. Add a monitoring report form for the internal floating roof petroleum storage tanks; and
6. Incorporate the conditions of the minor modification issued on February 6, 2002.

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Each modification is indicated by the symbol →. Permit conditions are in italics.

- The SO₂ CEMS satisfies monitoring requirements for the SO₂ emission limit of 200 tons of SO₂ in any rolling twelve (12) month period. As a result, Special Condition D.1.c. will be amended to delete the requirement that the permittee calculate SO₂ emissions using the monthly fuel usage and actual fuel sulfur content. In addition, the Department has determined that the SO₂ CEMS renders dual monitoring of the fuel sulfur content unnecessary (dual monitoring consists of the permittee sampling the fuel delivered to the site and also obtaining a certificate of analysis from the fuel supplier). The permittee will be allowed to provide one analysis for each batch (barge shipment) of fuel received using either method. Compliance with the fuel monitoring requirements of 40 CFR Part 60, Subpart GG - Standards of Performance for Stationary Gas Turbines will continue to be achieved. **Permit conditions will be modified as shown in the following paragraphs:**

Special Condition No. D.1.:

- b. *Fuel Data. Records on fuel usage and Receipt dates of fuel deliveries, type of fuel, quantity of fuel, date batch sample taken, and the analyzed sulfur content (percent by weight), nitrogen content (percent by weight), and higher heating value of the fuel (BTU/gal), and including copies of the supplier's certificate of analysis for each batch of showing the sulfur content of the fuel delivered received shall be maintained.*
- 1) *Sulfur Content, Nitrogen Content, and Higher Heating Value of in the Fuel. The sulfur content of the fuel to be fired in the combustion turbine generator shall be tested in accordance with the most current American Society for Testing and Materials (ASTM) methods. ASTM Method D4294-98 is a suitable alternative to Method D129-00 for determining the sulfur content. For each batch of fuel received, the fuel sulfur content (percent by weight), fuel nitrogen content (percent by weight), and higher heating value of the fuel (BTU/gal) shall each be verified by both either of the following methods:*
- a) *A representative sample of each batch of fuel received shall be analyzed for its sulfur content (percent by weight), nitrogen content (percent by weight), and higher heating value (BTU/gal); and or*
- b) *A certificate of analysis on the sulfur content (percent by weight), nitrogen content (percent by weight), and higher heating value (BTU/gal), including*

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the supporting laboratory analysis, shall be obtained from the fuel supplier for each batch of the fuel delivered by the supplier received.

~~2) Nitrogen Content in the Fuel. The fuel bound nitrogen content of the fuel to be fired in the combustion turbine generator shall be verified by taking and analyzing a representative sample of each batch of fuel received to determine the nitrogen content by weight.~~

~~3) Heating Value of the Fuel. The higher heating value of the fuel (BTU/gal) shall be determined by taking and analyzing a representative sample of each batch of fuel received.~~

Records of the sulfur contents (percent by weight), and nitrogen contents (percent by weight) and higher heating value (BTU/gal) of the fuel shall be maintained on a monthly basis.

~~42) Total Fuel Usage. Records on the total amount (gallons), and type, and sulfur content of each of the fuels fired in the combustion turbine generator shall be maintained on a daily and monthly basis. The dates of when the fuel is switched between Naphtha, diesel no. 2, Jet-A, and Heavy Straight Run shall be clearly identified.~~

c. Sulfur Dioxide Emissions. For the purpose of monitoring compliance with the emission limitation specified in Special Condition No. C.1.e.2) the total tons of SO₂ emitted by the combustion turbine generator shall be monitored and recorded as follows:

1) The Continuous Emissions Monitoring System (CEMS) shall record SO₂ emissions; and

2) During all periods the CEMS is not in operation or is not providing valid data, except periods of routine daily calibration, the permittee shall provide SO₂ emissions as follows:

a) For periods greater than one hour or an individual hour with varied load, SO₂ emissions shall be calculated using the following mass balance equation:

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$$SO_2 = a \times b \times S \times c$$

SO₂ = sulfur dioxide emissions, in pounds

a = volume of fuel fed to the turbine, in gallons

b = maximum projected unit weight of the fuel fed to the turbine, in pounds per gallon

S = fuel sulfur content in percent by weight (for example, for fuel having 0.4% sulfur content, S = 0.004)

S shall represent the highest of the 12 most recent fuel analyses (for the type of fuel fired during the period in question) determined by the methods specified in Special Condition No. D.1.b.1) or, the maximum sulfur content for the fuel as shown on fuel specification sheets

c = 2, the ratio of pounds of sulfur dioxide to pounds of sulfur

- b) For an individual hour with constant load, the permittee shall substitute the average of the hourly SO₂ emission rate recorded by the CEMS for the unit operating hour immediately before and the unit operating hour immediately after the missing data period.
- c) For a partial day of missing data, the permittee may calculate SO₂ emissions for the day using the mass balance equation of Special Condition No. D.1.c.2)a) and the quantity of fuel consumed over the subject 24-hour period.

Back-up data, calculations, and the resulting sulfur dioxide emissions shall be maintained. Records on the total amount of sulfur dioxide emitted by the combustion turbine generator shall be maintained on a monthly basis. Calculation of sulfur dioxide emissions shall be based on the monthly fuel usage and actual sulfur content of the fuels fired in the combustion turbine generator during that period. Back-up data, calculations, and the resulting sulfur dioxide emissions shall be maintained. Calculation of sulfur dioxide emissions shall be based on the following formula:

$$SO_2 = a \times b \times S \times c$$

SO₂ = sulfur dioxide emissions, in pounds

a = volume of fuel fed to turbine, in gallons

b = unit weight of fuel fed to turbine, in pounds per gallon

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~~$S = \text{weight \% of sulfur in fuel (for example, if fuel is 0.4\% sulfur, then } S = 0.004)$~~

~~S shall be determined using the procedure in this Attachment, Condition No. E.5.a.~~

~~$e = \text{molecular weight of sulfur dioxide} \div \text{molecular weight of sulfur}$~~

- Kauai Power Partners has **proposed** the following changes to Special Condition E.9., removing the requirement to provide sample calculations of SO₂ emissions with the semi-annual monitoring report form:

9. Semi-Annual/Periodic Monitoring Report Form

Combustion Turbine Generator. The permittee shall submit to the Department of Health sulfur dioxide emissions, in tons, from the combustion turbine generator in accordance with the following schedule:

- a. Semi-annual reporting. The permittee shall submit semi-annually, total sulfur dioxide emissions from the combustion turbine on a rolling 12-month basis. The report shall be submitted within sixty (60) days after the end of each semi-annual calendar period (January 1 - June 30 and July 1 - December 31).*
- b. Periodic reporting. Should SO₂ emissions exceed one-hundred eighty four (184) tons on a rolling 12-month basis, the permittee shall report those emissions within twenty (20) calendar days after the end of the month showing the exceedence along with information on the measures taken to ensure compliance with the 200 tons per rolling 12-month period sulfur dioxide emission limit.*

~~*The enclosed Monitoring Report Form: Combustion Turbine Generator Sulfur Dioxide Emissions and Fuel Certification or equivalent form, shall be used. In addition, each report shall be accompanied by sample SO₂ emission calculations used in determining the quantity of emissions for that period.*~~

The Department has determined that the statement requiring Kauai Power Partners to submit the monitoring report form in the permit or an equivalent form shall remain. The forms in the permit provide guidance to the permittee on the minimum amount of information that should be reported during the semi-annual monitoring period. Special condition E.9. is renumbered E.10. **The condition will be modified as follows:**

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Special Condition No. E.10.:

10. Semi-Annual/Periodic Monitoring Report Form

Combustion Turbine Generator. The permittee shall submit to the Department of Health sulfur dioxide emissions, in tons, from the combustion turbine generator in accordance with the following schedule:

- a. *Semi-annual reporting. The permittee shall submit semi-annually, total sulfur dioxide emissions from the combustion turbine on a rolling 12-month basis. The report shall be submitted within sixty (60) days after the end of each semi-annual calendar period (January 1 - June 30 and July 1 - December 31). Back-up data, calculations, and the resulting sulfur dioxide emissions obtained for the periods the CEMS was not in operation or was not providing valid data shall be submitted for the reporting period.*
- b. *Periodic reporting. Should SO₂ emissions exceed one-hundred eighty four (184) tons on a rolling 12-month basis, the permittee shall report those emissions within twenty (20) calendar days after the end of the month showing the exceedence along with information on the measures taken to ensure compliance with the 200 tons per rolling 12-month period sulfur dioxide emission limit.*

The enclosed Monitoring Report Form: Combustion Turbine Generator Sulfur Dioxide Emissions and Fuel Certification or equivalent form, shall be used. ~~In addition, each report shall be accompanied by sample SO₂ emission calculations used in determining the quantity of emissions for that period.~~

- The following conditions are amended to address changes due to the addition of the SO₂ CEMS.

Special Condition No. D.1.a.7) is renumbered to D.1.a.1)g) and modified as follows:

- 7)g) *NO_x, SO₂, CO, and CO₂ or O₂ concentrations in the stack gases using a CEMs system. If a CO₂ CEM is used, 40 CFR Part 60, Appendix A, Method 20, Equations 20-2 and 20-5 shall be utilized. The system shall meet U.S. EPA performance specifications ~~(40 CFR Part 60 Section 60.13 and 40 CFR~~*

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~~Part 60, Appendix B, and 40 CFR Part 60, Appendix F) as specified in Special Condition Nos. D.1.a.2), D.1.a.3), and D.1.a.4).~~ The CEM shall be on-line and fully operational, upon completion and thereafter of the performance specification test. The emission rates for NO_x, SO₂, and CO shall be recorded in ppmvd at 15 percent O₂ and lbs/hr.

Special Condition No. E.8.d. is modified as follows:

- d. *Excess emissions shall be defined as any rolling three (3) hour period during which the average emissions of NO_x, SO₂, and CO, as measured by the continuous emissions monitoring system, exceed the emission limits set forth in this Attachment, Condition No. C.1.e.1).*

Special Condition No. E.8.e. is modified as follows:

- e. *On and after the date of completion of the source performance test and CEMS certification, excess emissions exceeding the emission limits set forth in this Attachment, Condition No. C.1.e.1) indicated by the continuous emission monitoring system shall be considered violations of the applicable emission limit for the purposes of the permit with the following exceptions:*
 - 1) *During the forty (40) minute "startup" period of the combustion turbine generator; and*
 - 2) *During the twenty-five (25) minute "shutdown" period of the combustion turbine generator.*

- ➔ *For consistency, Special Condition No. D.2.b. pertaining to the black start diesel engine generator has been modified as follows:*

- b. *Sulfur Content in the Fuel. Receipt dates of fuel deliveries, type of fuel, quantity of fuel, date batch sample taken, and the analyzed sulfur content of the fuel, and copies of the ~~supplier's~~ certificate of analysis showing the sulfur content of ~~the~~ each batch of fuel delivered received shall be maintained. The sulfur content of the fuel to be fired in the blackstart diesel engine generator shall be tested in accordance with the most current American Society for Testing and Materials (ASTM) methods. ASTM Method D4294-98 is a suitable alternative to Method D129-00 for determining the sulfur content. For each batch of fuel received, ~~the~~ fuel sulfur content (percent by weight) shall be verified by ~~both~~ either of the following*

methods:

- 1) A representative sample of each batch of fuel received shall be analyzed for its sulfur content (percent by weight); ~~and or~~
- 2) A certificate of analysis on the sulfur content (percent by weight), including the laboratory analysis, shall be obtained from the fuel supplier for each batch of the fuel delivered by the supplier received.

Records of the sulfur content in the fuel shall be maintained on a monthly basis.

- Special Condition No. D.1.a. is renumbered for clarity.
 - Special Condition Nos. D.1.a.6) and D.1.a.7) (renumbered D.1.a.1)f) and D.1.a.1)g)) are modified for clarity. Special Condition Nos. D.1.a.2), D.1.a.3), and D.1.a.4) are added to provide clarity on operation of the CEMS and the performance of quarterly accuracy audits.
- 6)f) NO_x concentrations in the gas stream between the exit of the combustion turbine generator with steam injection system, and the entrance to the HRSG with SCR. Measurements shall be made by using a continuous emissions monitoring (CEMs) system. ~~Specifications and on-line requirements of the CEM shall be in accordance with item no. 7) below~~ The system shall meet U.S. EPA performance specifications as specified in Special Condition Nos. D.1.a.2), D.1.a.3), and D.1.a.4). The emission rates for NO_x shall be recorded in parts per million by volume dry (ppmvd) at 15 percent O₂ and lbs/hr.; and
- 7)g) NO_x, SO₂, CO, and CO₂ or O₂ concentrations in the stack gases using a CEMs system. If a CO₂ CEM is used, 40 CFR Part 60, Appendix A, Method 20, Equations 20-2 and 20-5 shall be utilized. The system shall meet U.S. EPA performance specifications ~~(40 CFR Part 60 Section 60.13 and 40 CFR Part 60, Appendix B, and 40 CFR Part 60, Appendix F)~~ as specified in Special Condition Nos. D.1.a.2), D.1.a.3), and D.1.a.4). The CEM shall be on-line and fully operational, upon completion and thereafter of the performance specification test. The emission rates for NO_x, SO₂, and CO shall be recorded in ppmvd at 15 percent O₂ and lbs/hr.
- 2) The procedures under 40 CFR §60.13 shall be followed for installation, evaluation, and operation of the CEMS.

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- 3) The CEMS shall also be operated according to the performance specifications of 40 CFR Part 60, Appendix B.
- 4) Quarterly accuracy audits (consisting of Cylinder Gas Audits (CGA) and Relative Accuracy Test Audits (RATA)) and daily calibration drift tests shall be performed in accordance with 40 CFR Part 60, Appendix F. Successive quarterly accuracy audits shall occur no closer than two months apart. Relative Accuracy Test Audits (RATA) must be conducted at least once every four calendar quarters.
- A monitoring report form has been added for the internal floating roof storage tanks.
- The following changes were made to the Special Conditions of the permit in the minor modification issued on February 6, 2002. These conditions will be consolidated into the issuance of the current minor modification. In addition, Special Condition D.1.a.6) (renumbered D.1.a.1)f))has been corrected to include language erroneously deleted in the minor modification:

Special Condition No. A.1.c. is amended and superseded as follows:

- c. *One (1) 72-foot high exhaust stack for the combustion turbine generator;*

The footnote a of Special Condition No. C.1.e.1) is amended and superseded as follows:

^a *gr/dscf @ 12% CO₂*

Special Condition No. D.1.a.6) is renumbered to D.1.a.1)f), is amended and superseded as follows:

- f) *NOx concentrations in the gas stream between the exit of the combustion turbine generator with steam injection system, and the entrance to the HRSG with SCR. Measurements shall be made by using a continuous emissions monitoring (CEMs) system. Specifications and on-line requirements of the CEM shall be in accordance with Special Condition No. D.1.a.1)g). The emission rates for NOx shall be recorded in parts per million by volume dry (ppmvd) at 15 percent O₂ and lbs/hr.; and*

Special Condition No. F.3. is amended and superseded as follows:

3. *The initial performance test shall be conducted at 50, 75, 90, and 100 percent operating loads of the combustion turbine generator, or at other operating loads as*

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may be specified by the Department of Health. Subsequent annual tests shall be conducted at 50, 75, and 100 percent operating loads, or at other operating loads as may be specified by the Department of Health. The Department of Health may define the type(s) of fuel for which the performance test will be conducted.

- a. The performance test on the combustion turbine generator shall be conducted for nitrogen oxides (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO), fine particulate matter (PM₁₀), volatile organic compounds (VOC), and ammonia (NH₃).*
- b. The performance test on the combustion turbine generator shall be conducted for carbon dioxide (CO₂) or oxygen (O₂) concentrations in the gas stream between the exit of the combustion turbine generator with steam injection system, and the entrance to the HRSG with SCR. If CO₂ is measured, 40 CFR Part 60, Appendix A, Method 20, Equations 20-2 and 20-5 shall be utilized. Although not required at this time, the Department of Health, if so desires, may at any time require the permittee to install and operate a continuous emission monitor to measure carbon dioxide (CO₂) or oxygen (O₂) in the gas stream between the exit of the combustion turbine generator with steam injection system, and the entrance to the HRSG with SCR.*

In the minor modification dated February 6, 2002, the Department approved a new stack diameter for the combustion turbine generator of seven (7) feet, ten and three-quarter (10-3/4) inches.

Conclusion:

This modification will amend, consolidate, and supersede in its entirety, Covered Source Permit No. 0452-01-C issued on March 7, 2001, and Minor Modification to Covered Source Permit No. 0452-01-C issued on February 6, 2002.

Modifications to the permit are detailed in the **Amended Permit Conditions** section.

The current modification does not affect emissions from the combustion turbine generator or the black start diesel engine generator. Nor does the current modification affect the ambient air quality analysis performed in the prior reviews. Information on emissions and the ambient air quality analysis can be found in the original review dated September 25, 2000 and the prior minor modification review dated February 6, 2002.

Issuance of a minor modification to the covered source permit is recommended based on the review of the information provided by the applicant and subject to the permit conditions and forty-five day EPA review.

Reviewer: CL

Date: 10/21/03